

- IV. "On the Arrangement of the Muscular Fibres of the Ventricular Portion of the Vertebrate Heart ; with Physiological Remarks." By JAMES PETTIGREW, M.D. Communicated by Professor GOODSIR. Received March 26, 1863.

This paper is a revised version of a previous one, having the same title, which was communicated to the Society on the 22nd of November, 1859, and formed the substance of the Croonian Lecture delivered by the author on the 19th of April, 1860.

The author has now included the results of his researches on the structure of the ventricular portion of the heart in fishes, reptiles, and birds.

*April 30, 1863.*

Major-General SABINE, President, in the Chair.

Pursuant to notice given at the last Meeting, Professor Heinrich Gustav Magnus, of Berlin, was balloted for, and elected a Foreign Member of the Society.

The following communications were read :—

- I. "On Spectrum Analysis ; with a Description of a large Spectroscope having nine Prisms, and Achromatic Telescopes of two-feet focal power." By JOHN P. GASSIOT, F.R.S. Received April 21, 1863.

(Abstract.)

The author, after briefly alluding to the discoveries of Fox Talbot, Wheatstone, Foucault, Kirchhoff, and Bunsen, and the importance of spectrum analysis, states that among the numerous spectroscopes which were exhibited in the International Exhibition of 1862, there was one which had been specially constructed by Messrs. Spencer, Browning, and Co., philosophical instrument makers in London, which at the time excited considerable attention. This spectroscope had two prisms, with a magnifying power of 40, its definition being remarkably clear.

The skill evinced by Mr. Browning in the construction of this instrument induced the author to have one made in which still better effects might be produced, by multiplying the number of prisms and increasing the magnifying power, with the necessary precaution to avoid as much as possible loss of light. After a few preliminary trials, it was finally arranged to use nine prisms, which is the number that can be applied with this instrument, although the arrangements are such as to allow the whole or any less number to be used with the utmost facility.

Verniers and micrometer screws are attached to the knife-edges of the slit through which the light to be observed is admitted to the collimator and to the telescope, also to the large circle of the instrument; these enable the observer to note the exact position of the lines observed in the spectrum from whatever source it is obtained, and thus enable him to repeat and verify previous results with the utmost exactitude.

When two small prisms, one refracting and the other reflecting, are fixed outside the knife-edge slit, spectra obtained from three separate sources can be simultaneously examined; and an illuminated micrometer scale enables the observer to note the precise relative position of the lines in the three spectra without reference to or reading off from the verniers. By this arrangement a most interesting spectacle may be obtained, showing in the uppermost portion of the field of view the spectrum of thallium, strontium, or lithium, ignited in the flame of a Bunsen's gas-burner; in the centre of the field the spectrum of the same substance in the oxyhydrogen blowpipe, and at the bottom one in the voltaic arc; each successive spectrum there exhibits an increased number of lines.

With this spectroscope the author has ascertained that the green line of thallium, so celebrated for its integrity, and hitherto believed to coincide with one of the lines in the spectrum of baryta, does not so coincide; for by employing the nine prisms with a power of 80 on the telescope, the thallium line is clearly seen to occupy a dark space in the baryta spectrum, close by the side of the bright line with which it was supposed to coincide.

A range of prisms is adapted to the telescope, the highest of which, when used in conjunction with the amplifying lens, gives a power of 110 with good definition.

The author states that the results already obtained by this instrument have been so satisfactory as to leave him no cause to regret the time that has been devoted to, or the expense that has been incurred in the construction of this truly beautiful apparatus.

A full description of the instrument is introduced, with several diagrams showing the construction and adaptation of the different parts of the apparatus, and two drawings, one showing the general appearance of the instrument when prepared for observation, and the other representing it as seen when viewed from above.

II. THE BAKERIAN LECTURE.—“On the Direct Correlation of Mechanical and Chemical Forces.” By HENRY CLIFTON SORBY, F.R.S. Received April 29, 1863.

Perhaps it may be thought somewhat strange that a geologist should undertake such a subject as the correlation of forces; but the very fact of my being a geologist has led to the investigations of which I now purpose to give a short preliminary account. In studying general chemical and physical geology, and especially in examining the microscopical structure of rocks, I have for a number of years been greatly perplexed with a class of facts which pointed both to a mechanical and to a chemical origin. At first I attributed them either to a mechanical or a chemical action, or to the two combined; but in most cases no satisfactory explanation could be given. At length, however, facts turned up which altogether precluded any supposition not involving direct correlation; for they most clearly indicated that mechanical force had been resolved into chemical action in the same way as, under other circumstances, it may be resolved into heat, electricity, or any other modification of force, as so ably described by Grove in his work ‘On the Correlation of Physical Forces.’

The effect of pressure on the solubility of salts has already been made the subject of speculation and experiment\*, and a considerable number of facts have been described, showing that pressure will more

\* Perkins, *Ann. de Chim. et de Phys.* vol. xxiii. p. 410. Sartorius von Waltershausen, *Göttinger Studien*, 1857. Bunsen, *Ann. der Chem. und Pharm.* 1848, vol. lxx. p. 70. Favre, *Comptes Rendus*, vol. li. p. 1027. Thomson, *Proc. Roy. Soc.* vol. xi. p. 473 (1861).